



## Insect pest and disease management in mushroom

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Mushrooms are the edible fleshy fruiting bodies, protein rich of prescribed fungi, which may be grown under cultivation. The most commonly cultivated mushroom species is *Agaricus bisporus*. Cultivated mushrooms are usually grown in the dark in climate-controlled rooms. The fungal inoculum or 'spawn' is added to a pasteurized substrate in growing containers or beds. After the fungal strands (mycelia) have spread through the compost, a layer of peat or soil (the 'casing') is added. The fruiting bodies begin appearing about 6 weeks after spawning and continue appearing in brighten up about 7-10 days apart for the next 6-8 weeks. To maintain atmospheric condition and precipitation. About one dozen mushroom species are commercially grown in the world but in Haryana state mainly only two species are cultivated which are grown at commercial level.

### Type of mushrooms:

- White button or European mushroom (*Agaricus bisporus*)
- Oyster mushroom or Dhingri (*Pleurotus* spp.)
- Milky and paddy straw mushroom
- Black ear and Shiitake

### Two widely cultivated species (Basis of the season):

*White button or European mushroom :*

- Optimum temperature - For spawning 20- 25°C for production, during production 14- 18°C.
- Optimum time for cultivation - In winter - Nov.- February

*Oyster Mushroom or Dhingri :*

- Optimum Temperature - For spawning 20-30°C
- Optimum time for cultivation - Whole year (except May-June)



White button mushroom



Oyster mushroom

### Major insect pest and diseases of mushrooms and their management :

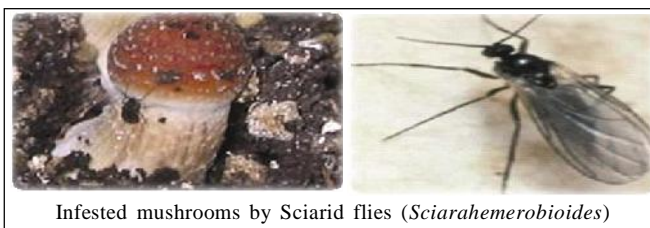
*Mushroom Flies :* Three types of flies have been found to cause damage to mushrooms (*Agaricus bisporus*) from time to time. These are small, delicate, black, yellowish or brown in colour with different types of wing venations and size.

- Nature of damage: Larvae or maggots (1/4 inch) have a shiny black head and an elongated, whitish to transparent body. They are most abundant in damp, rich soils and feed on root hairs, fungi and other organic materials.

*Control :*

- 1.2 to 1.0 g Diaflowbenzoran 25WC or Nimbidiseen (0.03%) 100 ml/ lit. to be added in 13-14 liter of water to mix in 100 kg compost. This insecticide should be added in the last turning of the compost. Out of this, anyone insecticide should be taken and used at the time of casing.

- At the time of the attack of the mushroom flies a spray should be done in inside of the wall of the mushroom house of Dichlorovas 76 EC 0.5ml., should be added in one liter of water at the interval of 3-4 days.



Infested mushrooms by Sciarid flies (*Sciarahemerobioides*)

*Mites (Acari) :* Mites are small, about the size of a pinhead, with white, yellowish, brown or red coloration and are often seen running speedily over the surface of the mushroom beds, fruit bodies, sides of the trays, walls and floors of the mushroom houses.



Mites (Acari)

– Nature of damage : The harmful mites damage the crop directly by feeding on the spawn and mycelium or puncture holes in mushroom caps and stalks and also cause stunting of fruit bodies as well as brown spots on the caps and stems.

**Control :**

– Diacophal 50 EC 1- 2ml. Kelthane @ 10 litre to be added and should be sprayed from time to time in the compost and on the wall of mushroom house.

– Cook out the exhausted compost in the trays with steam at 71°C for 10.12 hours.

**Springtails :** Adults are silver grey to ground colour with light violet band along the sides of the body and black cellular fields present on the head. Body length is 0.7 to 2.25 mm and abdomen 4-6 segmented. Antennae are 3-6 segmented. *Lepidocyrtus* sp., *L. cyaneus*, *Seirairicolor*, etc. are the main species damaging mushrooms.



Springtails

**Nature of damage:**

– Springtails cause damage to the oyster, button and shiitake mushrooms. Staying in groups in the dark, they feed on mycelium in the compost resulting in disappearance of mycelium from spawn – run compost. Fruiting bodies of button mushrooms are also attacked causing slight pitting or browning at feeding sites. In oyster and shiitake, they feed on gills destroying the linings and also eat out the mycelial strands at base of the stipes.

**Control :**

– Preventive measures like clean cultivation, proper pasteurization of compost and casing materials, proper disposal of spent compost, raising the crop above floor level etc., should be followed.

– Use of 0.05 per cent Malathion as spray for disinfection, mixing Diazinon 30 ppm in compost at the time of filling and spray of insecticides like Malathion or Dichlorovos at 0.025–0.05 per cent conc. during spawn run and cropping have been recommended for their control.

**Major diseases of mushroom:**

**Fungal diseases dry bubble:** *Verticillium fungicola*

- Muddy brown, often sunken spots on the cap of the mushrooms
- Greyish white moldy growth seen on pileus
- Later stage mushroom becomes dry and leathery



Dry bubble

– Initially infected one are not develop or remain small

- Main source of infection
- Favorable temperature 28°C
- High humidity

**Management of dry bubble :**

– Pick and destroy infected mushroom to prevent spread

– Sanitary conditions in growth house

– Lower the temperature to 14°C when disease noticed

- Use clean equipment
- Control flies and mites
- Bubble can destroy with salt



Wet bubble

**Wet bubble:**

*Mycogone perniciosa:*

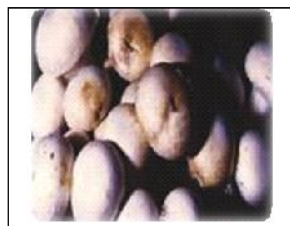
- Malformed mushrooms with swollen stipes
- Reduced or deformed caps
- Undifferentiated tissue becomes necrotic and a wet, soft rot emit bad odor
- An amber liquid appears on infected mushrooms.
- Mushrooms become brown in color
- Bubbles may be as large as a grapefruit.
- It is also a parasite of wild mushrooms.
- It produces two spore types, one which is small and water-dispersed like *Verticillium*,
- second which is a large resting spore capable of persisting for a long time in the environment.

**Control :**

- Sanitation in growth house
- Clean environment around cultivation area
- Incorporating Benzimidazole 150 mg/l. in the casing.
- Benomyl at the rate of 0.95 g/m<sup>2</sup>,
- Carbendazim and Thiabendazole at the rate of 0.62 g/m<sup>2</sup>

**Bacterial diseases :**

**Bacterial spot / Brown blotch:** *Pseudomonas tolaasii*.



Bacterial spot



Brown blotch

- Pale yellow spots on the surface of the piles later it turns to yellow
- In sever case mushrooms are radially streaked
- Damage at storage and transit
- High humidity and watery conditions are favorable for disease
- Vector: Tryoglyphid mite
- Lesions on tissue that are pale yellow initially later become a golden yellow or rich chocolate brown.
- Discoloration is superficial (not more than 2 to 3 mm)

**Management :**

- Sanitation
- Lowering humidity
- Watering with a 150 ppm chlorine solution (calcium hypochlorite products are used since sodium hypochlorite products may burn caps).
- If the mushroom stays wet, however, chlorine has little effect since the bacterial population reproduces at a rate that neutralizes the effect of the oxidizing agent.

**Viral diseases:**

- Virus (several)
- Double-stranded RNA
- Reduced cropping,
- Bare patches on the beds,
- Long-bent stalks with small caps,
- Premature opening of mushrooms,
- Stalks tapering towards the base of stalk,

**Source of infection of virus :**

- Infected mushroom spores
- Mycelium from previous crops also survive in the trays

- Mushroom sheds can also release infected spores
- Dust from around the farm may introduce infected spores
- Only 10 infected spores are required for a disease outbreak.
- Farm hygiene
- Maintain 60°C temperature throughout the compost
- Clean trays to prevent infection from old-infected mycelia

The cultivation of mushroom can also be helpful to overcome the shortage of food. Final yield depends on how well a grower has monitored and controlled the temperature, humidity, pests, and so on. Spawning is a tedious job so proper method with all precautions should be employed. Incubation period depends on species. Generally it varies from 10 to 25 days. After incubation when growth of mycelium is completed casing is done. Casing should be done strictly according to the procedure described with suitable material.

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